

A
NEW SYSTEM
OF
PHILOSOPHY,
FOUNDED ON THE
UNIVERSAL OPERATIONS
OF
NATURE.

BY JAMES USSHER,

*Ignæus est illis vigor, et celestis origo
Seminibus!*

VIRG.

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NEW SYSTEM

PHILOSOPHY

FOUNDED ON THE

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UNIVERSITY OF OXFORD



N A R E

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P R E F A C E.

I Was long dissatisfied with the mechanic philosophy, because I apprehended it did not afford a sufficient cause or explication of the grandeur, the beauty, the order, and design of the visible creation; all of which appear so legibly and strongly marked, throughout every part of this material assemblage, that no force, or power of system, are able to efface or suspend the common sense of them; this common sense, if I may call it so, comes unsought to the mind of man, as soon as he opens his eyes, or feels the unavoidable

avoidable train of his own perceptions ; and the further his reflections follow and trace out the particulars that form the vast group of beings around him, (provided he remain unbiaſſed by ſyſtem) the more minutely and univerſally will he perceive this beauty, order, and deſign ; and the neceſſity of reſolving them into a cauſe, ſuperior to matter and mechanifm.

The wretched and inadequate explanations of the mechanic ſyſtem, always made me look upon it as ſuſpicious and deceitful : I conſidered, that it accounted for the formation and production of bodies, by unperceivable qualities or modes ; and that it was only ſupported by an analogy to effects perceived by ſenſe. I then examined the foundation of this analogy, and diſcovered with ſurprize, that there was not in fact the leaſt ground or reaſon for it ; and that perceivable mechanic qualities,

lities, or modes, had none of those miraculous effects, attributed so lavishly by the mechanic philosopher to his minute and invisible shapes, sizes, and motions; and, in short, that the whole scheme was a philosophical chimera, totally repugnant to all known truth and reality.

Natural philosophy is a species of learning very flattering to the curious and inquisitive mind of man, and is in some degree the study of every body. My discovery had no sooner convinced me of the falshood of the system generally received, than I thought it incumbent on me to try at least to fill up the vacuum I had left in my own mind, and to attempt, if possible, to discover the true system of nature. I imagined we had a knowledge of her familiar operations, sufficiently extensive to carry us a great way in our search, if we did but put them faithfully together, and
compare

compare them. Ingenious men, I found, had made several discoveries by way of experiment, which at first sight encouraged me to hope a rational system of knowledge not impracticable. I then attentively considered what that knowledge, and those experiments, (as far as they came within my observation and reading) point out to us of the general scheme or plan of nature in this material world, and, from simply attending to fact and reality, I drew the out-lines of a draught, which I here lay before the public.

It may not, perhaps, be improper to place here a miniature idea of the system I attack. Mechanic philosophers suppose all the parts and particles of matter to be homogenous, and to differ from each other in their shapes, sizes, and motions only; and that natural bodies being formed by the concurrence and convention of the
minute

minute particles of matter, the whole variety we observe in natural bodies, is the mere result of the shapes, sizes, texture, motion, and rest of the minute and insensible corpuscles of which the particular bodies are composed.

This doctrine they pretend to derive from similar effects in objects of sense, and to establish on analogy or a parity of reasoning. *We see, say they, a piece of iron, by a change in the form, become a new thing, i. e. a knife, and acquire a new capacity of cutting and separating other substances: a piece of glass or resin, by a motion which beats it into powder, is deprived of its transparency, and becomes white: a piece of silver, by being burnished, loses much of its former colour, and acquires a new power of reflecting the beams of light, and visible objects, in the manner proper to specular bodies; yet all this is done by the intervention*

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of

of a burnishing tool, which often is but a piece of steel or iron, conveniently shaped; and all that this burnisher does, is but to depress the little prominences of the silver, and reduce them, and the little cavities of it, to one physically level, or plain superficies.

From phænomena, say they, we may proceed to establish general rules. When we see these changes produced in bodies by mechanic alterations, we are authorized to conclude universally, that alike effects will proceed from the same cause; and by the most rational and unexceptionable analogy in the world, to lay it down as an axiom, that the shapes, sizes, texture, and insensible motion or rest of the invisible corpuscles, determine the body, compounded of them, to be this or that particular thing, viz. a stone or an apple-tree, gold or sea-water. In order to explain this hypothesis, they assert, as I observed before, that all matter is homogeneous,

genous, and that tho' it may be conceived as infinitely divisible, (and would really be so by an agent of infinite power) yet, in the present state of things, it is reducible, by natural agency only, to certain very minute corpuscles; beyond which, there is no physical possibility of subdividing it farther; that each of those corpuscles are of some determinate bulk and figure, and capable of different degrees of motion; and that accordingly as these corpuscles happen to convene, they form an oak tree, a cloud, or a rock; which differ only in the mechanism of their constituent particles. So that the result of the corpuscularian philosophy, is, that size, shape, motion, or rest, are the catholic, primary, or radical properties of bodies; and that the other properties, as colour, taste, smell, &c. arise out of them, as secondary qualities, or mere effects.

But the supposed analogy, or parity of reason, which is the whole support of this

system, upon examination, appears to be fallacious and groundless; the iron of the knife is not changed or transmuted, it is only flatted and ground to an edge: the glass or resin pulverized, are still real glass and resin, mingled with particles of air, and thereby rendered white, as water is in foam; and burnished silver, is silver still: they are all the same identical natural bodies, and of the same real species they were before this egregious mutation; and therefore the true consequence, from these instances, is, that the different kinds of natural bodies, are not the result of insensible shapes, sizes, or motions, or of any mechanic quality whatever; and that there is no analogy in nature, that leads to such a presumption.

I must request of any person, who takes up his pen for the mechanic system, to point out one single instance in nature, of
a trans-

a transmutation wrought in a natural body, by an alteration in the visible and known shape, size, or motion of that body. This is a request he cannot with any reason deny me, if he attempts to support his theory on analogy, or parity of reasoning; but if he gives up the analogy, by producing no such transmutation, then I desire, he will shew any other foundation for his system; and he will make it appear, that it is possible to conceive, that any variation of shape, size, or motion, can naturally and spontaneously, cause this or that particular odour, taste, or colour, preferable to any other. Thus I have pointed out the only ground on which a mechanic philosopher may solidly answer me: but let it be remembered, that I protest in form, against his producing instances, where the transmutation is not real, and then making a transition to the new productions of nature; - How and

and supposing, instead of proving, that they are effects of alterations, in shape, size, or motion. The usual changes made by mechanism every day, from the ease with which they are conceived, are very apt to cheat us into a belief, that real essential transmutations are equally effects of the same cause. Mutations, in this tract of thought, are familiar it is true; so are dreams, and the thousand castles built every day in the air; but I insist on it, that this familiarity gives us no right to slide in, by a philosophic legerdmain, an analogy that does not subsist in nature, and after, to make a real foundation for science on that fanciful analogy.

Let me now say a few words, to introduce the following little plan of the operations of nature, in the changes that appear on the surface of this our habitation. I have concluded, from an attention to
 well-

well-known effects evident to sense, which I have placed in my reader's view, that the simple elements of bodies are ingenerable, unchangeable, and incorruptible, and were at the beginning created different, and divided into kinds or sorts; that the embryos, or seeds of natural bodies, are select compositions of these elements, which inherit in themselves, by a divine law, principles productive of new seeds and embryos, that continue and eternize the species by succession; that each kind of element being endued with particular attractions and repulsions, the specific seeds convene, and consolidate to themselves, their respective kindred and family elements, and resist and repel the unrelated and dissociable ones; whence in the natural round and course of attractions and repulsions, the productions and dissolutions we see in this transitory world, take place.

A NEW

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NEW SYSTEM OF NATURAL PHILOSOPHY.

A Great variety of Phænomena have The at-
proved, that the surface of this globe on mosphere.
which we live, sustains on every side an
ocean of Air, that is circumfused about it
to a considerable height; this thin ambient
liquid is called the Atmosphere.

The Air is replete with Fire, as appears Fire and
by the burning-glass, and a number of other water
experiments familiar to every curious en- perma-
quirer; it is also imbued with Water, which nent
condenses and becomes visible in the air- therein.
pump, when the elastic fluid, that rarifies
and suspends the Water, is withdrawn. Fire
and Water then seem to be permanent in
the composition of the Atmosphere.

Is the
great re-
servoir of
the vola-
tile parts
of bodies.

The Atmosphere is the vast reservoir to which the volatile parts of bodies are assumed, when those bodies are corrupted, and their crasis destroyed; and from which they return again, and are resumed into new bodies, to restore the youthful progeny of nature. The dissolution of animal bodies, and of soft flimsy vegetables, laid together in heaps in warm weather, is so sudden and abundant as to become observable to sense: a copious effluvium or steam is emitted from the putrid body into the air, offensive to the smell, and sometimes visible to the naked eye, while the body sensibly diminishes in bulk and weight; till at length the fugitive and volatile parts are exhaled, and little left behind but a small portion of clay, which served as a fixed residence or vehicle to the volatile parts that are escaped into the air.

The
clearness
and mo-
bility of
air, no
objection
to this.

The admirable clearness of the Atmosphere, or the Air that surrounds us, and its mobility, make us in our unpremeditated thoughts, to conceive it as a very simple fluid, or rather as a vacuum; but Air is the universal menstruum of nature; and those who are acquainted with the effects of menstrooms know, that the minute particles of bodies, dissolved and put asunder by them, lose in their new state their opacity, and (in respect to the menstruum) their

their specific weight; in short, the corpuscles of bodies disengaged and separated by a menstruum, become invisible, and float thro' every part of it.

The densest bodies, even metals, being laminated, admit the light copiously: sea-water is very transparent, tho' it be replete with innumerable particles of salt, which are remarkably rigid: some pipes that have conveyed the clearest waters for public use, have been found in a short time incrustated with stone, and at length wholly stopped by the successive apposition of stony particles: the most limpid springs are found often impregnated with metallic particles: from these, and numberless familiar instances, it is evident, that the corpuscles of solid bodies admit the light freely, while they are kept suspended by any elastic menstruum.

It is further observable, that heavy and light bodies swim confused and promiscuously, when their minute corpuscles are disunited and embraced by the liquid: gold, the most ponderous body we know, neither floats in *aqua regia* at the surface, nor yet sinks to the bottom, but is suspended throughout, as salt in water; camphire, which is much lighter than oil of vitriol, is dissolved by it, and is incorporated with it, without emerging to the top.

For the corpuscles of the densest bodies are transparent,

and suspended thro' every part of a menstruum.

The vast
assem-
blage of
corpuscles
in the air,
produces
very sen-
sible ef-
fects.

They
form the
Sky.

The
dawn and
twilight.

They
give us
the idea
of visible
distance.

Sustain
the clouds
in equili-
brio.

Though the minute corpuscles, sustained in the Atmosphere, float there invifible, and give way in that yielding fluid fo easily, as to remain imperceptible to the bare feeling, yet the prodigious affemblage of them there, is not without proportionable effects, palpable enough : they form that noble and lovely blue canopy fo magnificently arched over our heads : they reflect innumerable rays of light to the earth, and form the dawn and twilight, thofe foft approaches to day and night ; when the oblique rays of the fun at a few removes below the horizon, ftrike upon them and are reflected to the earth : they have a vifible effect on the appearance of the fun and moon at the rife and fetting, when the fplendor of thofe luminaries is foftened, by paffing to the eye through a greater depth of Atmosphere : they form that enfeebled appearance, which gives us the idea of vifible diftance, for the objects that near us glow in lively colours, as mountains, fields, or woods, at a diftance, look to be circumfufed in a blue mift, too faint to be called a cloud, or fmoak, till, as we recede from them, they wholly difappear, and fink in the circumfluent ocean of air : the Clouds are fufained by them in equilibrio, and float in them : the yielding atoms that glide from us in the paffive air while
it

it is still, if the storm blows, and the whole tide rushes one way, bear down houses and large forests, and sweep the vast seas in mountains. However insensible the opposition of every single particle be, and however irresistible the motion and force of a cannon ball, that shatters and lays in dust the firmest castles and fortresses, yet it is in a few moments deadened and overcome wholly by the numberless and successive oppositions of those particles : they also give the mass of Air a surprizing weight and elasticity, whose wonders are sufficient matter for a particular treatise.

Occasion
of storms.

Stop the
motion of
bodies.

And give
weight
and elasti-
city to
the air.

When we conceive fire, water, and the volatile elastic elements of bodies floating together, and forming an immense ocean on the surface of the earth ; and when we attend to the natural effects of such a fluid, we have reason to believe, that Air is nothing distinct therefrom, and owes all its properties to those mighty principles united into a liquid, not so active as fire, but more fluid, elastic, and active than water, or the corpuscles of matter.

Air a
composition
of
fire, wa-
ter, and
the vola-
tile ele-
ments of
bodies.

Clay is the common basis, and unchangeable unfleeting consistence, that consolidates all vegetable and animal bodies, which gives them stability and fixedness, and remains naked to the eye, when the volatile and specific elements are transpired and

Clay the
common
basis of
growing
bodies.

and fled. As some elements are much less volatile than others, and recede more leisurely, the *caput mortuum*, or clay of corrupted bodies, differ in their qualities for some little time, but at length, by their final egress, the deserted clay becomes of the nature of the soil it lies on.

These
particles
the source
of fer-
tility.

The clay of perished bodies deserted and stripped, discovers itself, and puts on its pristine form once more; while the transient and volatile elements, that have broke their bonds and escaped, mingle with the circumfluent Atmosphere, where they are scattered by the action of the sun, till they impregnate the whole fluid with the seeds of life. In process of time, being absorbed by the rarified vapours, and the clouds that scour the regions of the Air to and fro, they descend in prolific showers and dews, and make the smiling earth teem with plenty and beauty. Elements of a different nature, that are not arrested by vegetables, enter with the rain into the fissures of the earth, and lodging in masses, proper for their reception, form metals, stones, and other fossils. Whence it has happened that shells of fishes, ears of corn, plants, and leaves petrified, are found sometimes in the hearts of blocks of marble; and that columns of stone have been discovered irregularly fluted, like icicles, pendant from

Of me-
tals and
stones.

from the roofs of grottoes, and subterraneous caves, made by the slow dropping of water, that brought stony particles along with it in successive layers. Pure Clay is wholly barren. The fertility of the earth is a foreign, alienable acquisition, by no means permanent in the soil, as appears from the changeable state of lands shifting from fertility to barrenness, and from barrenness to fertility; this truth also is evident from the whole practice of agriculture.

The corruption of vegetables is in many instances so gross, as to become observable to the senses; but their generation and nurture are too slow and retired for any immediate observation of sense, by which we may become acquainted with this mysterious part of the conduct of nature; however even here, she is not wholly inaccessible. It appears by chymical analysis, that vegetables are compounded of dissimilar elements, and that the same kind of vegetables are always resolvable into the same chymical principles. It is also evident, that the various families of vegetables require somewhat a different nourishment, from hence, that every kind of manure is not proper for every species of plants; and that each kind of vegetable will not promiscuously grow in every air or soil.

The

Tubes
and vessels com-
mon to
vegeta-
bles, as
well as
animals.

They
cannot be
supposed
to per-
form o-
ther than
the office
of tubes
and ves-
sels.

The use of microscopes has discovered, that trees and plants are finely organized bodies, provided with curious vessels, tubes, and ducts for imbibing, containing, and secreting the diluted aliment. They, whose language and ideas are formed by the mechanic system, seem to attribute vegetation, and the production of new bodies, to the mere form of those organs, or to a certain texture of them : but surely had men been able to recover the infatuation of system and learning, they would perceive, that this is an extravagant power, they bestow on form or texture, far above any efficacy ever known to reside in form or texture, and unjustified by experience or reason. Channels, tubes, and vessels, are necessary for the passage and reception of alimentary juices, but they can only perform the part and character of vessels, tubes and channels ; it is true, the mechanic philosophers, very judiciously, make their active and miraculous spigots and sawcets, their corpuscular sizes, and miracle-producing shapes, too minute for inspection ; but I would fain know, by what authority they will bestow powers on forms or texture in miniature, which no perceiveable or known form or texture is able to perform? When the wheels, pillars, and other parts of a clock or watch are put together, we know that the one may

may be moved by a spring, the other by weights; but the form alone considered of these wheels and pillars, and the apt texture of them, operates just as much as the beauteous and admirable texture of the human frame does in a sleeping man. A spiggot and fawcet, a sphere and a pyramid rest by each other as quietly as two mountains, nor do we know any form that confers on matter a greater activity. The power of form or texture, as active agents, is wholly visionary, and destitute of any foundation in nature.

It is a rule which common sense has established in philosophy, that we should not recur to an unknown cause, when one sufficient for the effect is known. Attraction and repulsion, with which matter is demonstrably endued, seem quite sufficient for all the effects, which the mechanic philosophers have so wantonly bestowed on form and texture.

Every body, and particle of body, attracts or repels other bodies at limited distances; this becomes sensible when small bodies are suspended in air or water. Several phænomena have demonstrated, that where the attractive power ends, the repulsive begins. When salt-water is evaporated, the saline particles unite into sensible masses, which demonstrate this attraction

traction when they approach within a certain distance. Also, these little masses are found pretty equal, and of the same figure, which shews that the corpuscles, before their conventions, had every where in the water the same situation in respect of each other, that is, were every where in the liquid equidistant, and constantly repelled each other with equal forces. It is thus, the minute elements of bodies repel each other in the air, and refuse to assemble into sensible masses, which would cause them to precipitate to the surface. The mutual repulsion of corpuscles in their suspension, forms the wonderful Elasticity of the Air, whose sphere of energy, or repulsive force, is vastly expanded by heat, and contracted by cold. The residence of the corpuscles of bodies in the Atmosphere, accounts familiarly for the pressure of the Air, and for the varying weight and density of the Atmosphere, at different seasons and situations. When we reflect on the action of the sun, and the state of the air, replete with volatile, combustible, spirituous, and discordant elements, we may comprehend the causes of Trade-Winds, Storms, Thunders, Lightnings, and the various convulsions of that fluctuating region. An effect, similar to the comparative grossness and weight of the air, near the surface of the

Elasticity
of the air.

Its density
and
weight.

Origin
of winds,
thunder,
and lightning.

the earth, is taken notice of in another department of nature, for sea-water is more saturated with salt at the bottom. Gold, or any other ponderous body suspended in a menstruum, would afford the same phenomenon, if the quantity were sufficient for observation.

The cause of attraction, or how body affects body out of contact, we don't know, nor even are we able to conceive; yet it is no argument against truth and fact, that we cannot form a conception of the manner: nor could it ever enter into any body's head to make the incomprehensibility of it, an objection against the matter of fact, or against the possibility of a real visible effect, but that of a great logician, and a great scholar. Attraction and repulsion, in matter, is intuitive knowledge, no more to be doubted than the existence of bodies, and when once we attribute these affections to plants and seeds, and to the elementary atoms that float in the ambient air, while they are volatilized and dispersed by the energy of the sun, we can form some conception of the nature of vegetation. The specific, regular, and sociable attractions of the various embryo's, (if I may call them so) of growing bodies, is strongly suggested, and brought near to a certainty by the following observations :

Specific
attraction
matter of
observa-
tion.

What is left of exhausted ores, being a long time exposed to the open air, recover, and yield again their proper minerals. The *caput mortuum* of vitriol, will, in the same manner, regain its acid; and lime will, in length of time, grow again towards a stony concretion.

A climax hath been often observed, from man down; first through the species of brutes that approach nearest to human reason, still descending by minute gradations, thro' different degrees of sense towards the vegetable world; but providence hath not left her offspring of an inferior rank without an equal guide: for parallel to this, but in a retrograde order, may be observed another climax, calculated for the direction of creatures not destined to reason. Man sets out with reason and faint instincts; the animals next below him in the scale of reason, proportionably exceed him in strength and clearness of instinct, as they are exceeded again by such as feel the glimmerings of reason more faint; till where sagacity and contrivance seem totally to vanish and be lost, there Divine instinct takes the reins and conducts infallibly, without the least appearance of reflection or deliberation. Attraction and repulsion to select proper nourishment, and to reject the improper, is the ultimate and perfect degree of instinct,

adapted

Attraction
on the
instinct of
vegetables.

adapted to the station the vegetable holds in the creation. Attractions in growing bodies, and instincts in the animal, are equally abstruse to the reasoner, equally necessary, and equally apparent in the creation.

When we approach thus far towards the mysterious recess of vegetation, we are obliged to conjecture, at what passes within the bridal chamber and childbed of nature: this may be tolerated, provided we keep her general manner in view, that our conjectures coincide with the part of the operation that comes within our knowledge; and that the causes we assign, bear a proportion to the effects. We may suppose the original fœtus, or body, exclusive of all accrement, to be a minute composition, of select and proportioned hypostatical elements lying together, without effect or activity, till they are actuated and separated by a proper degree of heat (for the chief ministry of heat seems to be to separate heterogeneous parts). In this first ferment we may suppose that they are restrained and limited by reciprocal attractions and repulsions; as by so many springs and bandages of different capacity, till the parts take their proportioned and specific forms and situations; thus we may imagine the first sketch of the creature is generated; for the seminal

nal parts being put in motion, and exerting their peculiar attractions and repulsions, sociable and affectionate corpuscles run together and embrace, while the inimicable and repellent disunite and fly asunder, by which means a regular organized body is constituted. Nobody will, I believe, suspect that I mean to account clearly for the propagation of the species; that most amazing and sublime work of nature, in which inconceivable power peculiarly acts with a more bold and open hand, and almost draws the lofty curtain that shades the Almighty agent from human view, leaving atheism thunderstruck and hopeless. I only begin from the mysterious work of propagation, and point out how we may conceive the regular law of nature, or method adopted in the subsequent growth of bodies, by that genius, whose energy constitutes nature.

The advance of youth towards manhood, and decline towards old age and death, effects of the same law of nature.

The natural vicissitudes of plants and animals, in their earliest growth, and along from infancy to old age, and death that closes old age, seem all to be effects of the same laws; for the primary, hypostatical elements (besides their own kind) attract other kindred elements, with whom they associate, in the formation of the infant body or vegetable; from which new association it happens, that the future attractions

tions are not exactly the same with the foregoing, for the lately acquired particles, that are not perfectly similar to those by which they were attracted, exert their own proper powers of attraction, and attach new elements; thus a compound attraction still varying, and still deviating farther from the first, is gradually formed; till, in the round of attractions, beginning from the most gentle and unfelt removes, there be at length elements of repugnant discordant natures introduced, which bring on a mutual repulsion, strife, and discord, that weaken and decay the body, shatter the constitution, and produce infirmity and death. Agreeable to this universal œconomy, we see, within a small compass of time, the qualities and internal composition of fruits, and of short-lived annuals, constantly changing towards ripeness, and afterwards shifting towards decay; and ripeness itself, which is the state of perfection, towards which the fruit is cherished by indulgent suns, is the very beginning and first stage of decay and corruption. Vegetables of a more robust constitution, suffer the same vicissitudes, but slower; and their different qualities are observable at a state of maturity, and at the various stages of a greener age. Our palates sufficiently attest, that animals are subject to the same law;

Cause of
infirmi-
ty and
death.

law ; from which also we may account for the alteration in the taste of man, as his years encrease ; and deduce the cause, why the same food does not agree with his stomach, at the different periods of his life. This silent and unceasing vicissitude of nature opens to our view the avenue to the house of death. We may conceive attraction, like Janus with two faces ; one like youthful Nature bestowing bloom, strength, and vigour ; the other face resembling ancient Time, with a scythe cutting down and devouring his own children.

Material
bodies not
necessari-
ly mortal.

It is the prevailing opinion, that all material bodies that grow, must necessarily perish, and suffer wreck by the hand of time ; and that the only means of preserving youth and immortality to material beings, must be by miracle. This, like other trite opinions in general, arose from the present prospect which appears to the mind, and is true only with regard to our actual situation ; for did the different elements, of which the infant body is composed, attract only similar elements ; or were the attractions of the constituent parts reciprocal and equal, so as to limit and fully employ each others energy, and in mutual embraces to sleep in apathy and indifference to external corpuscles, I do not comprehend how such bodies could suffer decay or death.

death. When we conceive the constituent parts of a material body, attracting elements in kind only; or so adjusted as to employ reciprocally their own whole energy and attractive virtue internally, and to sleep in apathy to external bodies, then we have an idea of a material body naturally immortal; and, in the latter case, divinely freed from gravity, and capable of motion over the earth, and through the air, much easier and less impeded than the flight of birds. Let us then suppose a most gentle and insensible deviation in the law of nature; let us suppose each element, besides its own kind, attracts also those neighbouring elements, that make the nearest approaches to its nature; such a deviation, however gentle and unfelt for any limited time, must produce in bodies a succession of attractions, eternally receding from the first attractions of the hypostatical and original composition; it must, by bringing on confusion and intestine opposition, open a door for disorder and death in the animal and vegetable creation, and measure out to the various species of animals and vegetables a length of natural life; or, as we call it, a course of nature, proportioned to the bold or gentle deviations, made by the specific seeds or embryo's of growing bodies, according to which, the strides of each particular species towards dis-

Cause of
the dif-
ferent
longevity
of the va-
rious spe-
cies of
creatures.

solution will be flow or precipitate. This new law we have supposed, must also introduce disturbances in the air and earth, a variety of natural evils, and a total revolution in nature.

Expansion of
the air by
fire,

the cause
of num-
berless
phæno-
mena.

Fire a
body.

The volatile particles of bodies expand or contract their sphere of attraction, and thereby occasion the different degrees of the expansion of the air. The extension of the sphere of energy of the volatile particles, so as to fill up the intervenient distances, and come within mutual reach and influence, by which they are enabled to lay hold on, and to attract the related or specific principles, and to repel the diffociable, depends chiefly on the presence of fire. Fire expands the sphere of activity of each minute corpuscle by its presence, or contracts that sphere by its recess; whence proceed the commotions of the air, and an infinite variety of phænomena, among which are eminently the vegetation and corruption of growing bodies.

Fire is an exceeding subtle and active body. I call it body, because its effects discover it to be so very plainly; it sensibly distends iron and spirits of wine; rends the grossest bodies, and generates motion: which attributes can only be allowed to body, unless we confound all our ideas of matter, and reject the most satisfactory evidence of sense. The fire, by dilating the
air,

air, by quickening and expanding the sphere of attraction of the minute atoms, at the same time that it distends the pores and alimentary vessels, gives the vegetable liberty to imbibe its essential and constituent nourishment. What the systole and diastole of the heart perform to compel the fluids through an animated body, the vicissitudes of cool and warmth, night and day bring to pass in a vegetable, by condensing and expanding the air, the fluids, and the vessels that drink them in. Its ministry in vegetation.

Water adheres to, and cements the minute and fugitive particles of bodies. Fire gives them elasticity, and rends them asunder. It is, probably, by the cohesion of water to the corpuscles of the grosser elements, and by its levity, when rarified, they become fugitive. The fire evaporates the water, and wings away the minute particles that cohere to it, upon the ætherial wings of the liquid element into the atmosphere; by which œconomy it for ever replenishes the inexhaustible stores of nature, and supplies the wardrobe of successive springs. The cohesion of water to the elementary particles of bodies occasions the drying of winds; for those invisible atoms fanning the surface of the earth and waters, dip their wings in the liquid wave, and carry off the imperceptible dew-drops by successive millions. Ministry of water. Drying of winds.

Combi-
nation of
fire and
water ne-
cessary
both in
vegeta-
tion and
corrup-
tion.

The joint operation of fire and water seem necessary in the dissolution and vegetation of bodies; or rather the ministry of the water, when it is animated and put in motion by fire. The power of moisture and heat in combination, are known to every body in vegetation; but that combination is also equally necessary in the dissolution of bodies. Flesh does not corrupt in frosty weather: the carcases of men are found whole and fresh on the *Andes*, secured in eternal frost. In hot and dry countries, where the moisture is exhaled from the flesh, we find nearly the same effects; the bodies of men are tossed about in Arabia, in the deserts of Africa, and the south part of Persia, whole and inoffensive of smell, for years, perhaps for ages, embalmed in ætherial fires. The adust climate of Upper Egypt, has contributed more to the preservation of the bodies of their dead, than their spices and balsams. Heat and moisture in concert awaken all the elements to life and action, and that action in course produces vegetation and corruption. Let me here deplore our ignorance of the nature of those two distinguished elements, and the attachment of mankind to that barren philosophy, which, by turning the attention of the learned to the trifling powers of mechanism, bound down all genius, and laid an arrest on the know-
ledge

ledge of nature, except what is merely acquired by accident.

The cohesion of animal and vegetable bodies is destroyed, and their essential fugitive elements separated and restored to the air, by a languid intestine motion or ferment; which in corrupting bodies is no other than the opposition and encounter of discordant elements, supplied with force to repulse and expel each other, by the active rage of fire, till they fly asunder and leave only a *caput mortuum* behind; which, as I said, is no more than a small mass of clay, that served to consolidate and unite the fugitive particles. In the dissolution of moistened bodies, the mass putrifies, discharges a gross steam or *effluvium*, and contracts a black colour; because the substance is then universally rent, and become a perfect riddle or sieve, no longer capable of reflecting the light.

Ministry
of fire in
the dissolution
of
bodies.

Bodies replete with juices, heaped together in large quantities, ferment and corrupt suddenly. If the fire, and the fugitive elements actuated and invigorated by the fire, have a sufficient efflux, the heap only putrifies and wastes into an inconsiderable parcel; but when the passage of the vapour is choaked, and the heated atoms (now become extremely volatile and elastic) react upon the fire, the conflict becomes violent,

Nothing
annihilat-
ed by fire,

lent, the hostile elements break forth in a visible combustion, and precipitate into the air in a bright flame. The fire annihilates nothing : what is consumed thereby ascends leisurely above the precincts of the flame in a thick cloud of smook, and apparently mingles with the *Æther*. If in their passage, the ascending invisible particles meet with any body to which they may adhere, they gather upon it, in soft layers of soot, with which you may once more feed the flames. The tallow and wax of candles, in their recess not only affect your smell, you may catch them over the flame on any substance, to which oily particles are apt to adhere.

except the
union or
affocia-
tion.

There is no reason then to suppose any, the least corpuscle to be lost, altered, or annihilated by the fire; its effects are only to dissolve the crassis or union of the body. Every element, and every particle of matter, remain unalterable, and for ever the same. Nor is there room to judge that fire intimately pervades the simple elements of matter, but only by its fluid activity, insinuates into the interstices, as water does into a sponge. A ball of iron red hot is not a ball of fire, but a ball of iron perforated, and glowing with fire. When the fire has separated all the *minima naturalia* in bodies, and thus become continuous,
and

and those *minima naturalia* are not volatile, as in metals, then they swim in the fluid fire, as salt does in water, and the superficies or bulk of the metal is considerably encreased. When the fire is afterwards exhaled then the particles of the metal lie close and compact on each other, and the mass becomes rigid.

Melting, what.

* Fire a menstruum for metals.

Bodies that are not combustible, to which nature has given a kind of stability, as metals, stones, and other fossils, require some of them (as stones) a very high degree of heat to destroy their constitution; iron and copper resist a mighty force of sudden fire, yet fall beneath its constant and slow attacks, when it employs an acid that saturates the whole ocean of air, to eat away those metals in rust.

In bodies compounded of different elements, there is something fabricated that did not exist in any of them singly, like the green in colours, formed by the conjunction of blue and yellow, or ethiops mineral, formed by the mixture of sulphur and quicksilver; but this, something new, is only the result of the composition; the original elements are neither destroyed, corrupted, nor altered; and, if

In the composition of simple elements, there is nothing real destroyed, corrupted, or altered.

* This is an observation I owe an ingenious friend of mine, who read over this system in manuscript.

we

we had senses acute enough, we should see the distinct principles of the blood and bones, of an ash-tree or an apple, just as a man would see the component parts of a piece of cloth, made of silk and worsted, if he should unweave the web, and separate the threads.

Since I have run into a low similitude, I must beg leave to continue it for the sake of illustration, and to observe, that nature only weaves and unweaves, without altering any of the materials; and that she cautiously hides from our inspection her pure and constituent elements, by blending them together, the moment she renders them visible or tangible.

Elements
of bodies
ingener-
able and
incompact-
able.
Species
the per-
manent
offspring
of general
laws.

The simple elements of bodies are, in every sense, ingenerable and incorruptible: the species of natural bodies are equally permanent, tho' the individuals pass away, because their embryo's or original principles are formed by fixed and eternal laws, of the same association of incorruptible elements; whose attractions therefore in selecting their aliment, are invariably the same through the corresponding stages of life. The classing of growing bodies by the similarity of their infant state, and the steadfast uniform laws under which they grow up to maturity, is expressed by the word

word * species, when it is applied to natural bodies. Chemists who investigate bodies

Chemists discover the same elements in every age.

* Since learning and system have so far vanquished common sense, as to make men deny the specific formations of nature, which women and children know, and of which birds and beasts, who cannot abstract, confess their sense in the most intelligible language imaginable, in their pursuits, their aversions, and their loves; and since those who deny the specific productions of nature, in vindication of their system, produce the variations found by chemists in their analysis of the same species, as a proof that nature doth not work regularly on the same plan; I am obliged to point out the cause of the variations in question, and shew that they in reality may depend on specific or parallel natural productions: but first, that heedless people may not be imposed upon, by an equivoque in the objection, let it be observed, that, by the word *variation*, or any equivalent thereto, is not meant that the onions of this year, are resolvable into the same chymical elements with the turnips of last year; or that the onions of this year, are found to want the principles into which they were resolvable two hundred years ago; or have changed, like the fashion in wooden furniture, from oak to walnut, and from walnut to mahogany; the variation spoken of in the objection is not of this kind, but something very different, of which I am just going to speak.

Any person who compares the wines of a hot, dry season, with the wines of a moist cool season; or the fruits, the vegetables, and drugs that are produced in different soils and climates, will perceive, by the senses, the variation which gives foundation to the objection: now can we suppose that the vine, whose fruit differs in the different seasons, is not the same identical being, and governed by the same general laws, each of these two seasons? certainly, no; it is obvious then, since the same identical stock in different circumstances, produceth the variation objected, the specific productions of nature may also, in the same different circumstances, be supposed to vary proportionably, though they have been planned by nature rigidly on the same model, and subjected to the same laws.

The learned objectors will not deny, that if the watery, insipid grapes of a moist season, had met with a dry, hot

bodies by fire, have in every age, by their decompositions, discovered the same chemical

season, or had grown in a warmer climate, they would have had a more delicious, elevated, and spirituous tastes, and would yield wine proportionably good: if the coffee-plants of our plantations were propagated in Turkey, there is no doubt but the fruit would mend; on the contrary, the plants of Turkey would degenerate in the plantations; at least, such improvements and degeneracies happen every day: and, by a reverse of circumstances, if the degenerated plant, or its offspring, was removed from the plantations back again to Turkey, its original climate, the fruit in time would become native Turkey coffee, and the plant be naturalized once more; from whence it is evident, that the generating law and œconomy of nature, in the vine, and the coffee-plant, is uniform and the same, and that those variations which are objected, must necessarily follow from the uniformity of nature, acting under different external circumstances. I must explain myself.

Every organized body is formed of various original elements, consequently endued with a variety of attractions; from whence it must follow, that, according to the difference of the soil, of the climate, and temperature of the air, there will be a different proportion of the essential elements attracted; of the specific elements that abound, there will be more; and of those that are deficient, there will be less. Let us suppose the coffee-plant, by an uniform eternal law, to attract four specific elements only, which we may call A, B, C, and D; then, from the perpetual variety in the soil and climate over the globe, and the different proportion of these elements, must proceed an endless variety in coffee, more of some elements and less of others; and the difference will still encrease, from the attractions that vary, as plants and animals grow old: the frame and constitution of the embryo or seed, throughout the species, is ever formed and modelled by the same law every where; but the acquisition will be influenced by the proportion of the elements in the soil, air, or season; and the variety from those external circumstances would be much more considerable, if the specific laws had not been so severe, that, when a vegetable does not meet with a sufficient proportion of each element of its proper nourishment, it pines and dies;
just

mical principles, or hypostatical elements (as they call them) to have subsisted in the

just as a lion or a tyger who live by prey, would starve in a meadow, replenished with vegetables, sufficient to feed an hundred families of other animals.

From the premisses it results, that the slight variety found by chemists in the temperament of different bodies of the same species, is no objection to a similar production through the species, governed by the same immortal law; on the contrary, it is evident that the variety objected must ensue from the very uniformity of nature in her specific productions, and, from the same identical plan, carried on in different circumstances: by tracing the same reflections on, we may account for the peculiar and favourite productions of climates, for the diseases that attack strangers who come from a different climate, and a variety of other curious and interesting phenomena.

Animals, who change their situation perpetually, who often, within the compass of a few hours, breathe a pure and a gross air, and whose food is various, must suffer a more apparent difference of constitution, than vegetables who quit not their native abodes.

The uniformity of nature in the original draught, and in the future nurture of the individuals within the circle of the distinct classes or species, accounts fully for the perpetuity of the species, and the similitude of the individuals within those classes, to each other. It would enforce the mechanic system vastly, to account in like manner for the generation of things in kind, for instance of rhubarb or trefoyl, with such nice similarity for ages. I do not mean the abstract species, but the real substance that purges, and the vegetable, whose seeds are sown by husbandmen for pasture. I say it will enforce their system much, if mechanic philosophers will account for this specific similarity in the productions of nature, or even shew that it is possible to account for it on their principles. But if these familiar works of nature, and her universal laws, be so inconsistent with the system, that it is impossible they can exist upon its principles, then it seems reasonable to conclude, that this system is not the real system of nature.

same kind of bodies, with no variation but what might be allowed for accidents attending the investigation, or for the external differences of climate, soil or air.

The most ætherial and volatile parts escape from chemists,

proved by the fruitless endeavours of chemists to redintegrate bodies.

I speak of chemical elements, to distinguish them from the pure elements of nature; for chemical elements are but compositions, that, by their strict embraces, resist the separating force of fire, like alkaly and sand in glass. The chemists fires utterly disengage the seminal ætherial parts, and other very subtile elements which they denominate volatile; the less fugitive (which if the body had corrupted in the ordinary way of nature would also escape) being left behind, by the sudden and violent recess of the more ætherial, cohere now more strictly; and these associations are the fixed elements of the chemists. The reality of this representation of the fact, and the utter recess of the most volatile and insensible parts by the fire, are demonstrable from the fruitless attempts of chemists to redintegrate the bodies they have analized. It is not also improbable, that several particles of fire adhere a considerable time to the parts that remain, after passing through the chemists hands, as in lime. Tho' the pure elements of nature elude the search of chemists,

chemists, as well as of the rest of mankind; yet the chemist is perfectly able to demonstrate that she forms her bodies of incorruptible, unchangeable elements; because they have always resolved the same species into the same chemical elements, making the allowances I have mentioned before: they also are able to mimic some of her rude compositions, particularly in the formation of vitriols.

It is difficult to form any probable conjecture of the number of simple elements. If we consider the remarkable œconomy of nature, the frequency of the same chemical elements, and the extensive powers of combination, we may reasonably conclude they are not many. It is probable the elements, when simple, are much more powerful and active than in composition; in which state they restrain, limit, and soften each other: and this opinion seems to be sufficiently testified by the violent smell with which the disengaged corpuscles of corrupting bodies strike the sense, and by the power of the air in restoring health, or communicating infection. It is a conjecture I have often made, and which I submit to future investigation, that poisons contain an element that is powerfully attracted, expanded, and actuated by fire; but which repels and severs with violence
the

the other hypostatical elements of animal bodies. The particular virulence of poisons in hot climates, the stream of fire that seems to run through the whole frame of a person bit by a viper or other poisonous reptile, the internal and external symptoms, and the cure of serpentine poisons, agree with this conjecture. It is observable, that however offensive the steam of putrifying bodies be, yet when it has blended with the mass of air, the whole is sweet and exhilarating. Probably when the air is overcharged with any particular element, it is morbid and pestilential. That the air of some climates is replete with elements which other climates want, is pretty evident from the trees, plants, and fruit that flourish in some countries, and languish or utterly refuse others. For the same cause certain animals thrive in one country, and will not in others; and men grow sickly in foreign regions, though the natives enjoy a perfect health.

I have thrown together these few crude and immature observations, that contain some of the distinguished out-lines of a system of physics, capable of endless improvement. A system that is simple, obvious, and perfectly becoming Infinite Wisdom; wherein the most frugal œconomy imaginable, and an inexhaustable resource
of

of riches, which neither time nor eternity are capable of wasting, are displayed. But what renders them of some value is, that the simplicity, the grandeur of this plan, and the eternal reservoirs of nature laid open by it, are not fictitious, but a faithful and exact delineation taken from nature. It hath been observed justly, that men are often right in their practice in opposition to theory*. While philosophers and scholars amused the world with a catholic matter, which formed bodies of different kinds, according to the shapes and sizes of its wandering particles that cohered into sensible masses; and while chemists, on the credit of the sages of learning and knowledge, were wasting their health and fortunes, endeavouring to hit on the texture and constitution that forms gold and the elixir of life, out of this catholic matter; farmers, tradesmen and mechanics, blessed with plain common sense, and the want of learning, went on just as if the species of nature were permanent and unchangeable; they sowed corn, acorns, flax and hemp, and put out their sons to trades upon the expectancy that nature produces in kind, and that the next violent shuffle of corpuscles, or a windy March, would not by new

* See Spectacle de la Nature.

evolutions and concussions, produce bodies of a confused kind, different from what tradesmen are skilled in. Such a prodigious and refined philosopher as Mr. Locke might contemplate his abstract and nominal essences. Tradesmen and peasants deal only in the real things which they handle and possess. They have no sort of acquaintance with abstract essences; and kind nature, from the days of Adam to this, has favoured them with similar productions; so as to enable them to make provisions, at a long distance of time, and to be certain of the kind of crop, while nothing yet appears but a green blade, or even before a green blade yet sprouts forth.

Whether a mechanic philosopher avows it in express terms or no, it is an unavoidable and fundamental part of his hypothesis, that the kinds of bodies that form the world, and consequently the amazing and beauteous order thereof, are the effects of the undirected concourse of particles of various shapes, sizes, and motions. When a writer of romances tells us of a sumptuous palace in a desert island, blazing with gold and diamonds, guarded by griffins, and built by a genie or enchanter, nobody above the age of childhood gives credit to the relation; though spirits, and beings far superior to ourselves in power, be the proposed

posed agents. But when a philosopher gravely tells us, that the sun, the moon, the stars, and this habitable globe, with all its wondrous progeny, where every single body hath such amazing traces of superlative wisdom and power, are formed in consequence of the mere shapes and sizes of the constituent particles jumbled together; and relates a thousand times more violent and numerous metamorphoses than those of Ovid, without the poet's probability of introducing a God equal to the work; I say when a philosopher tells us this wondrous tale we listen to the venerable sage with applause, and swallow down the stupendous legend for knowledge and learning. I can assign no reason for this credulity, but that the doctrine is beyond all limits of common sense; for there is a certain noble heighth in extravagance, to which if once we be able to carry our system, it becomes free from all examination or trial, like the countries on the surface of the moon; and if we be luckily enough to make a few converts of note, then it may pass freely upon the millions who judge only by precedent.

Here I am sensible that numbers of people, of profound reading, are ready to ask me, with learned indignation, is not this the experimental philosophy which (when the rubbish of the Peripateticks was cleared away) arose regularly and solidly, built

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upon

upon innumerable experiments and phænomena? I own I fully conceive the force of universal judgment pre-conceived against me, and have little hopes of success from any thing I can say in opposition thereto. When I consider the exorbitant power of pre-possession, and the adamantine chains of system, in which have been industriously twisted every solution and every phænomenon, I am ready to fling away my pen, and in despair to commit the few lines I have wrote to the flames; yet, if I could dispose my indulgent reader to hear me with patience, to conceive that a system universally received may be erroneous, and that it is not always presumption to examine tenets of some standing in the world, I would endeavour to demonstrate, that the system I oppose, is in reality founded on no one experiment, and that the phænomena produced in proof thereof, give no evidence in its favour; but, on the contrary, serve effectually to destroy it. Let us always keep in our view, that the shapes, sizes, and motions of corpuscles (which are supposed to determine the kind of body) are below the observation of sense; and that the system has no proof or probability, but what results from the changes made in bodies, by an alteration of sensible shapes, sizes, and motions.

Now,

Now, all the arguments produced by mechanic philosophers to prove a catholic matter, and that the different shapes, sizes, motion, and texture of the insensible parts, are the causes of the variety we see in bodies, are, I think, reducible to two sorts: the first kind of argument is drawn from the works of art, to which are given new names, that do not signify any particular substance or body, but only a shape or use; thus a cup, signifies a small vessel for holding liquor, whether of maple or silver; and a watch, a little portable machine for measuring time, without regard to the particular metals it is made of. Observe (says a mechanic philosopher) this cup was part of a block of wood in a turner's yard, before that, it was a green tree, now, by virtue of a shape and size, it is become a new thing, (viz.) a cup; but if I throw it into the fire, by the violent motion thereof, it shall suffer new changes; first into fire, then into ashes, and finally into clay. This watch, that is, the matter of it, was under various appearances indifferent mines: by the motion of the fire those minerals became brass, gold, and iron. These parts being framed into new shapes and sizes, and aptly put together by the watchmaker, a watch was generated; now destroy that texture, and the watch ceaseth to exist; after whose dissolution, by virtue of

new impressed shapes and sizes, that matter may be transmuted into a tea-spoon, a piece of money, or a bodkin: these, and such-like, are the favourite illustrations of the experimental philosophy.

But is not this mere chicanery, and juggling with words? the watchmaker makes no real change in the substance of which he constructs his watch, by his new forms and texture; nor is there any essential change made when the watch is destroyed: the gold, the silver, and the brass, are the same they were in the mines mingled with other fossils. To expose this contemptible sophistry, we need only strip off the new name (*a watch*) in which the whole of this pompous transmutation consists, and placing our eyes on the materials, observe the metals, of which he composes the machine, pass thro' his hands, and see if he has made a transmutation in any of them; if he has by his new shapes, sizes, and the motion of his fires, made the parcel of metal called *Gold*, out of a different kind of substance, for instance, out of wood, stubble, or stone? or will it, by a new shape and motion, be transmuted into pearl, ivory, or tin? It would be trifling with my intelligent reader, to take any pains to prove that all such instances, instead of supporting the mechanic system, serve to betray the utter weakness of its foundation.

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The second kind of argument urged by mechanic philosophers to establish their hypothesis, arises from the changes that happen in natural bodies. We see (say they) milk turned by a languid insensible motion into a thin sour milk, and a rich cream: and the latter by a brisker motion in churning, converted into butter and butter-milk. Also water, by the motion communicated to it by the summer's sun, is transformed into mud, by which metamorphoses the world is in danger of being, in length of time, deprived of all its humidity, if it be not providentially replenished by some friendly comet that passeth by in our neighbourhood. Philosophers threaten us also with equal danger from a gradual deprivation of light, by means of the quantity which is every year shut up and lost in vegetables.

We have still a great deal of water, and a great deal of light. As to the milk, it is far more rational to judge it to have been a compound body, in which the oily parts, as well as the butter-milk, for the most part pre-existed; that the heat, according to its nature, separated them. I said the butter-milk pre-existed for the most part in the milk, because almost all liquids receive great alteration from the air by fermentation; which alteration is owing to the intrusion of some very volatile matter, as here of acid into the milk; or else to the
recess

recess of some fugitive and spirituous parts. But there are no such violent and astonishing metamorphoses in nature, as the Corpuscularian supposes; only a simple separation of different elements, or a recent composition formed by new attractions. The mud, which remains after the water is evaporated, never was water, but fixed, solid particles that floated in the water, and now subsides in the form of dregs, when the liquid, in which they were suspended, is withdrawn. *Vappa* differs from wine in this, that the spirit of the wine, together with the peculiar vehicle that attached and retained the spirit, are transpired and fled. Wine, highly saturated by an acid that floats about in the air, is called vinegar: and *Must* differs from wine, in possessing the vehicle or attractive element of spirit; but it has not yet imbibed the spirit, which it selects by fermentation from the air.

The affections, qualities, or modes of material bodies, as they are called, may be divided into three kinds; the first, in worth and consideration, are the permanent and natural qualities, such as their smell, taste, colour, their effects on other bodies, and the effects of other bodies on them; and every other property, which is constantly found in every sensible part of that body, while the substance remains in the same state, without acquisition or dissolution. All the modes,

modes, or affections of bodies, that come under this head, are evidently permanent, and depend on the original nature and established essence of that body; and the determined laws under which it was produced to being.

A very different and inferior kind of modes that belong to matter, are those that are not intrinsic or permanent, but merely accidental, external, and transitory; such are the particular figure, size, and motion; which may be changed in an endless variety, without any alteration in the natural body or substance; these are properly called modes, or accidental conditions. To call figure, size, or motion, first or primary qualities, is an hypothetical manner of speaking, and the hypothesis from which it arose, ambiguous and imaginary: nor does this consideration, that every body and part of matter, is of some shape and size, and may be of other different shapes and sizes, tend to prove, that the specific character or essence depends on the shapes or sizes of its minute particles, but the direct contrary. I call the hypothesis imaginary, because there is not a single instance in the known creation, of a transmutation effected in the substance or natural body, by a variation of shapes, sizes, or motions. Now though we should take analogy for a good and sufficient argument in this case; I want to know by what
analogy

analogy men are authorized to say, that the kind of substance, or natural body, is changed by an alteration in the shapes, or motions of its constituent parts?

The third kind of modes found in material bodies, lie between these two I have mentioned; and may be called compound modes, because they are natural and permanent though they be external, and such as we may conceive might be varied, without any alteration in the substance or body; such are the form of the leaves of vegetables, of fruit, and flowers. I do not speak here of the forms of animated creatures, because they require some further considerations.

Matter cannot by any condition, mode, or quality we know of, act on mind, as a being, void of thought, it can have no capacity whatever of creating thought, or generating idea. If matter were the primary cause of its own properties, or possessed them by an independent, uncreated nature, it could never affect the mind of man or brute; whatever impulses their bodies might sustain from it, those impulses could no more reach mind, or create idea, than they could enlighten planets, or create new worlds. All the perceptions of matter in the mind, are the immediate impression and influence of a Being, whose empire extends

tends over matter, and who intimately acts on mind or spirit. If this Supreme influence were withdrawn, the mind, in every situation, would reside as perfectly remote from all external sensation, as a man in a swoon or fast asleep.

As there existed no physical material agent, prior to the creation of matter; created matter and all its modes, conditions, and appurtenances, without exception, had the same origin or cause. The Creator thereof made it what it is; it is not therefore the creator, or cause of its own conditions, modes, or operations. Nature and efficacy took being from the same power with matter itself, and depend equally on that power. So that the operations of matter have no dependence on matter, but are the arbitrary creation of the same parent virtue; besides whom, we cannot, without absurdity, suppose any other agent or physical cause: or, to say the same thing a little differently, whatever is independent and uncreated, hath independent powers; but what is created and dependent, hath no independent powers. As it had no powers before its creation, it had upon its creation no spontaneous nature, tendency, agency, or relation. All it possesseth, it possesseth by a title, no higher than its own origin, the mere will of its Creator. It is not therefore strictly just to say, the creating virtue made the sun fit and proper to

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yield

yield light, or gave bodies or particles of bodies an apt disposition to reflect such a colour, or proportioned fire and water to attract each other ; but his will or *fiat* poured forth the light from the sun, and bound the elements into one universe, through which his will is the universal energy. Yet we, whose sensible knowledge begins at matter, without perceiving the hand wrapped in darkness behind, speak of the agency, nature, tendency, and relation of matter, and of material bodies ; which words serve for common meaning in the intercourse of life ; but, in strictness of philosophy and truth, these words bear reference only to the general laws under which the Divine Will regulates the universe.

The knowledge of mechanism, and the laws of motion, are useful in the commerce of life, while we are engaged among matter ; because the author of nature acts by general laws ; but to hope to acquire the knowledge of causes by investigating the laws of motion and mechanism, is as vain as to attempt to discover a man's mind by measuring his shadow. After the experience of so many thousands of years, and after the learned world have been groping in this illusive philosophy so long, we have not yet discovered in matter the primary cause of any of its effects : nor if we were

endued

endued with senses acute enough to behold distinctly the *minima naturalia*, and to parcel out the single rays of light, as a man would separate gold, silver, and brass coin, could we expect to discover first or real causes; which are no other than the arbitrary volitions of the Sovereign of nature. A writer of the mechanic philosophy, in the enthusiasm and torrent of system, says, that if a person were suddenly endowed with senses, acute enough to distinguish the particular rays of light, he should see the colours of bodies vanish, and instead of them infinitely small corpuscles of different shapes and sizes, proper to transmit this or that colour to the eye. Had he been in his cool, unbiaſſed senses, he would certainly have considered, that tho' his sight should be so exceedingly quickened, as to behold in full proportion an atom a hundred times smaller than the minutest ray of light, yet he could see no particle or body that wanted colour, because nothing besides colour is an object of sight. And, after all, if he could see his uncoloured rays, he would be still to seek for the cause why squares and triangles raise in the mind the ideas of green and red; or why rays of a certain shape cause there the idea blue, and not yellow; these effects appear notwithstanding to be the arbitrary
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influence

influence of the power who animates the scene of matter over the mind ; and there is an easier conceived connection between the motions and courses of whales in the sea, and of clouds in the incumbent air, than between shapes or motions, and colours.

General laws demonstrate the unity and consciousness of the Lord of nature, stronger than any other conclusion, drawn from a regularity of effects to a designing cause ; for this reason, that the instances are infinitely more numerous, that appear in proof of design, in the universe, than in any work of human construction, and also more present and striking.

— *Deum namque ire per omnes
Terrasque tractusque maris cœlumque profundum ;
Hinc pecudes, armenta, viros, genus omne ferarum.*

VIRG. Geor. IV.

The Deity fills all this earth below,
The boundless heav'ns, and far as waters flow ;
Hence man, and ev'ry herd who peaceful rove,
And murd'rous tribes who stain the common grove.

*Principio, cœlum ac terras camposque liquentes,
Lucentemque globum lunæ, titaniaque astra
Spiritus intus alit ; totamque infusa per artus
Mens agitat molem, & magno se corpore miscet :*

Inde

*Inde hominum, pecudumque genus, vitæque volantum,
Et quæ marmoreo fert monstra sub æquore pentus.*

VIRG. ÆN. VI.

At first, the world of waters, earth, and skies,
The shining moon, and stars that glorious rise,
A mind sustains, pervades, inspires the whole,
To the vast universe, a living soul;
The source of tribes distinguished thro' the plains,
Of herds who wander, and of man who reigns;
Of feather'd families who æther sweep,
And monsters underneath the marbled deep.

We have no means of knowing, by intuition, the virtues and most useful properties of bodies; it is time and experience that give us this useful knowledge; we are making discoveries in the virtues of herbs, and in other provinces of nature to this day; and, after the joint experience of ages and nations, there are discoveries of importance reserved to our posterity: let us consider then how the mind proceeds to make discoveries, and to lay up knowledge for future use: the bodies themselves keep their virtues a profound secret, and we have not leisure or means to make experiment or trial of every individual, and indeed it would be inconvenient and impossible to do so; in short, let us see how do we form our general knowledge of bodies?

It

Nature
forms the
species,
and in
classing
her pro-
ductions,
we only
keep an
eye on her
method.

It is the known method of nature, to produce many particular bodies fit for the same purposes, and qualified to answer the same uses or ends; and on those bodies which serve reciprocally to the same ends or uses nature hath affixed common marks; which serve as characteristics or labels, sufficiently similar, to distinguish them from every other kind of natural body, and to parcel them out ready to our hands, without danger of confusion, when we want them for use. To this purpose we may observe, that natural bodies are endued with some obvious appearances, that meet the senses as it were, and imprint themselves on the mind. In such select associations as they arrive there, transmitted from external objects, and form the ideas, or scenery of nature; of these familiar occurring ideas, those which come to the mind by the eye, as colour and form, are the most distinct, lively, and picturesque; by the imitation of which, the painter is able to deceive us, and to draw pictures, that irresistibly raise the ideas of absent bodies, and thus become a significant, and most vivid language. There are also other characterizing properties, that are not objects of sight, and which colours do not represent; such as the smell, taste, comparative weight, hardness of bodies, the voice of animals, &c. all of which

which serve the purpose of forming the patterns or characters of things in the mind, by which we distinguish the bodies around us. Besides these obvious and familiar appearances, there are other latent and retired properties, which form the use, the virtue, the powers, the commodity, the convenience of the thing; and these two kinds of qualities, are in select combinations, united with such constancy and regularity in bodies, that the first or showy qualities, serve effectually to point out the residence of the second; and to distinguish the individuals in which they reside from all others; and as nature appears to have these select associations in view throughout her works, and accordingly has divided her productions into tribes or families, we find trees, herbs, metals, &c. separated by their peculiar and distinguishing marks, by which we may readily class them without hesitation; so that when once we discover the latent or retired virtues or uses, of one individual within the class, we then know the virtues or uses of the whole class; and give to the particulars one common name, expressive of a common nature and use. And such a select groupe of properties, common to several individual bodies, but so peculiar to those bodies, as to distinguish them from all others, is what forms the species

species or kind. I would not be understood to speak of the species of animals, because the method of classing them is somewhat different, and they require a particular explication. If what I said needs further illustration, and it be tolerable to represent by a very low similitude, one of the noblest dispositions of Providence, we may conceive the picturesque and distinguishing modes or properties of bodies, to serve to discover individuals according to their uses, in the same manner as the little labels do, which shopkeepers put upon their boxes and drawers, to direct them with speed and certainty; or as the colours, by which the soldiers, who compose an army, are regimented; and in reality they are the universal marks that form the language of nature, and discover to us our food, our fuel, our remedies, our materials for building, cloathing, for agriculture, &c. In short, they direct all animated creatures to their inheritance in the vast common of nature. Without this permanent order and union, neither man or brute would ever be able to acquire experience, so as to be able to provide for themselves; but would remain their whole lives as mere novices, as at the day of their entrance into the world. This most sublime and kind disposition of things into distinct

distinct and permanent species, is an irresistible evidence that the world is the work of a Being of thought and design, and would never have originally been controverted by philosophers, if it did not lead men directly to the consideration of a Deity.

Having, in numberless repeated trials, and without any exception, found that the same latent, and the same obvious qualities reside together, we consider their union as a fixed law of nature; which begets a certainty in us, that where the usual, obvious properties or modes reside, there, also we are sure of meeting the latent and commodious properties. Experience teaches us, that the paintings of nature are the language of truth; in consequence of which, a carpenter or mechanic goes to the wood, and chuses his kind of timber for peculiar purposes, without mistake; the druggist, the hop-merchant, the baker, all go to market, and buy with the greatest security, directed by the obvious and apparent qualities: the druggist requires no experiments to distinguish rhubarb from garlic, or to lay in medicines for pukeing, for purging, and other effects on the human body, from an affiance in the permanency of the specific laws of nature, tho' there be no apparent relation between those effects, and any

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thing he sees or perceives, and he has yet made no experiments on those very drugs. It is always to be observed, that, in this specific union of qualities or modes, I always mean permanent natural qualities, which include the first and third kind I have spoken of, but never the transitory and accidental modes.

A philosopher, with profound stupidity and learning, tells you, that he himself is the author of general knowledge, and of general natures: that he has created a kind of shadowy unreal essences, called nominal, or abstracted essences, by which he classes the bodies of the universe, and by this means gives birth to general knowledge: by this stroke of pedantic vanity, he obliterates the most admirable order of Providence, and puts the common Guardian of Nature out of view: luckily, he is not able to make the countryman even comprehend his meaning, and indeed it requires a considerable perversion of common sense, to make a man even conceive abstraction, tho' the countryman commonly has much more useful general knowledge, than the philosopher.

There is another kind of philosophic wrong to the Lord of universal being. I observed, that created matter could have no spontaneous, independent quality, mode, or pro-

property; that all we perceive is the arbitrary will of the Creator, who dwells upon the human mind with sovereignty, and pours over it the animated scene; yet, for the sake of the percipient mind, and in order to procure it general knowledge, on which the support of life depends, there is an order, a regularity, and connection maintained, which we call the laws or order of nature: the sun, when he retires from our hemisphere, leaves us to winter and an angry sky; when he returns, he brings summer along with him. His youthful influence, and gentle showers, cover the naked fields with spring and verdure. When the philosopher has stored up in his mind those constant laws and successions, he is apt to mistake the preceding link for the real primary cause, or physical agent, thoughtless of the mighty arm behind the curtain: but the rustick, who can distinguish no distance, no natural cause intervening, between the stupendous operations he is witness of, and the tremendous power who operates; and knows, with the certainty of common sense, that mere matter is utterly incapable of the transcendant wisdom, contrivance, and puissance, which he beholds above, below, and around him; finds himself as it were bewildered and swallowed up in the Divinity,

nity, and yields with awe to the consciousness of omnipotence: he is sensible of the order of providence in the species of things, and of the sublime language which directs all animated beings to their food, their wants, and course of life: he hears and sees the almighty power in the storm that bends the forest like reeds, and turns up the vast ocean in flitting mountains. When the earth is cloathed in darkness, or when a blank and universal stillness hangs over the woods and fields; or when nothing is heard but the voice of birds, or murmur of waters, he is then conscious of the silent operations of nature going on, and of standing alone in the awful tremendous presence of universal Spirit, who surrounds him on all sides with might and visible operation. This noble, soul-taught, enthusiastic philosophy, is the philosophy of untutored, unprejudiced spirit, enlightened by simple truth; for a Creator cannot receive assistance from any auxiliary natural cause, nor can the mere creation of his will bring him aid by its powers, whose powers only are his will put forth: he wants no instruments in alliance with him: he is not in necessity of a sun to lighten the day, or of sulphur and nitre to flame forth in thunder, seeing that it is his arbitrary will

will that flames in the nitre, and shines in the sun.

I have some time entertained a suspicion, which I would be glad were discussed by persons of reading and leisure; it is, that the system I have been endeavouring to trace, is not new, but of all others the most antient; and had fallen into oblivion, before the other antient theories were thought on, much about the time mankind unfortunately lost sight of their own origin, and sunk into endless errors. In reading some of the writings of the antients, there appeared to me the *vestigia* of a theory of the order of nature, which they did not themselves discover, nor even comprehend while they repeated it. It seems to be a fragment saved from the wreck of oldest time, and preserved with religious care by the Egyptian priesthood, and is in substance what I have been attempting to delineate, (viz.) that the elements of material bodies are unchangeable and incorruptible, and are shuffled from one body to another without any real alteration.

*Nec species sua cuique manet, rerumque novatrix
Ex aliis alias reparat natura figuras,
Nec perit in tanto quicquam (mihi credite) mundo,
Sed variat, faciemque novat, nascique vocatur*

Incipere

*Incipere esse aliud, quam quod fuit ante morique
Desinere illud idem. Cum sint huc forsitan illa,
Hæc translata illuc; summa tamen omnia constant.*

OVID. Met,

Nor rests the stamp specific on the clay,
The form forsakes it, and dissolves away;
The falling ruin nature's hand supplies,
She molds new figures, and in youth they rise,
No loss she suffers in her wide domain,
But by new changes still renews the plain.
To quit one shape is death, and to adorn
A shape untried, is titled to be born.
From hence those fled, and thence these others came,
Yet thro' all time the whole remain the same.

This looks like a broken unintelligible fragment of the oldest wisdom, preserved as a sacred relique by the Egyptian priesthood, and learned from them by Pythagoras along with the true planetary system. Whether the Egyptian priests understood the tradition clearly, may well be questioned; for in their time, all remains of primitive knowledge, was over-run with fable and analogy: as for Pythagoras himself and his followers, they did not comprehend it. The metempsychosis, and transmutation of the four elements, seem to be a gross, indigested conception thereof; he spoke like
one

one who speaks in an unknown language; he spoke truth and reason in the text, but when he attempted to explicate his own words, he fell into confusion and error.

The Greeks, who had no intelligence of the birth of nature, but what was confused and darkened by fiction, copied their systems of physics, and of the planets, from the gross perceptions of sense; which they modelled according as the imagination led them: we succeeded to their learning, and one of their systems, with a few amendments, is the present standard or mode of philosophy; into which the phænomena of nature are forced and complicated, as those of the planets were into the Ptolemaic and Tychonic systems: the ground-work of the system I am speaking of, is easy to the imagination; they saw every thing made by the hand of an artist, was formed out of pre-existent materials, whence

Ex nihilo nihil fit.

The changes made by mechanics in the figure, size, respective position of the substances they wrought on, and the necessity of motion to make those changes, afforded them the most familiar analogy in the world. The theories of the Greeks, in general,
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included the notion of pre-existent matter; they could readily conceive that a Being of power and contrivance could make lofty palaces, crimson garments, and golden diadems out of contemptible materials; but to create the materials themselves was wholly beyond the verge of human comprehension. The consideration of a world manufactured out of proper materials, obtrudes upon the imagination, at first sight, the idea of a potent artist, till we take a closer view of things, and then the inflexible nature that necessarily belongs to eternal independent matter, resists the idea of the controul or interposition of a Deity; as the accidental conventions and textures, which must be the result of motions and agitations in its minute particles, appear inconsistent with providence and design; and men of reflection are obliged to give way to the doctrine of fate and chance, to the spontaneous nature and eternal laws of matter, and to leave nothing to do for the Deity, and no apparent necessity for his existence.

Mens philosophic opinions will always have an influence on their religious belief. Much about the time the mechanic system made its way into the schools, the doctrine of fatal necessity spread over the Christian world: this system, which probably was
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in its origin calculated to explicate appearances, without recurring to the Deity, however palliated, carries with it a tincture of infidelity. In this view we may see the secret spring of Mr. Bayle's insidious reflection, *that men of no learning were seldom atheists, but for the most part people of deep study and close reasoning*; for the more penetration and sagacity a man is endued with, who gets into the material system, and the generation of things, in virtue of the shapes and sizes of their constituent parts, the deeper he will sink into atheism or fatalism; the clearer his conviction will be, and the stronger he will be able to entrench himself against all people who attempt to dislodge him with arguments drawn from the same principles. While the peasant, the savage, who are unperverted and unestranged from common sense by learning, behold with conscious terror the wonders of the Deity opening round them; they bend to the power whom they perceive to be present to them on every side, with puissance and majesty, that withers and dissolves the heart of man, and wraps him in perplexity, surprize, and unutterable awe.

The mechanic system, as it is called, presents us with corpuscles of various shapes and sizes for compleating the world

out of them, but offers us nothing to make them even cohere together; or if a cement were provided for them, do they afford any principle of motion to make them assemble; or if they were put in motion, by any means, do we see a rational cause for the formation of any single body in the universe, much less for the beauteous order and constancy of universal nature: the greatest patrons of it must allow, that it is extremely bungling and inadequate to the effects; besides, be it remembered, that those prolific shapes and sizes are only ideal, and not objects of knowledge; and that the analogy is not supported by any known instance: on the other hand, attraction and repulsion, in matter, are objects of sense and intuition. Motion, and the cohesion of matter, are simple, obvious effects of attraction; and when the parent seeds are created under determined laws, then the course of nature extends before us simple and sublime, with the eternal stamp of the Divinity upon it.

When we place in view the idea of this system, we stand in the center or termination of a thousand vists, which, from any other point, present nothing to us but obliquity and irregularity; or we are like the astronomer in the sun; who there sees all the planets move round him in circles, which,

which, from any other station, seem to travel in confusion and perplexity. The tides, so apparently governed by the presence of the moon, and those mighty globes who feel, and in their courses yield to the social band of this our planetary system, *confess* attraction; and the astronomer is obliged to subscribe thereto; but the natural philosopher, deserting this obvious and sufficient cause, calls in a different principle to account for the motions of nature, in the minuter parts of her works: a principle which flurs over things superficially, without explicating any thing; which is always found barren, and of no assistance to discovery or invention; is incapable of being proved or examined, and will serve equally well to account for inconsistencies or contradictions: such is the principle which clears up phænomena, by referring enquirers, who seek for the causes of the various productions of nature, to the invisible and insensible shapes, sizes, and motions of the constituent parts of bodies. What is satisfactory to a curious mind, in this system I offer, is, that the foundations thereof, the attraction and repulsion of minute bodies, are matter of intuition and sense. The cause of attraction and repulsion, I own, are retired from observation; but they are palpable and undeniable;

niable: they seem to be the boundaries of our knowledge, and to stand in the prospect of the human mind, betwixt light and darkness.

The mobility of the minute elements of bodies in the atmosphere, together with their attractions and repulsions, open a new world of knowledge to us. The weight and elasticity of the air, the motion and drying of winds, trade-winds, thunder and lightning, concerning the causes of which we were in obscurity, become all familiar and easy to us. We can conceive nothing clearer, than if a magazine of volatile and elastic particles, pent up and contracted by the cold, under the superficies of the earth, meet with a train of fire; or an accidental junction happen in their neighbourhood between two volatile particles, whose effects are like the accension of spirits of wine and spirits of turpentine; that then they may, in an instant, expand with a sufficient force to heave up and overturn mountains and large cities, and rock the incumbent surface as far as the communication of the mine reacheth, thro' the subterranean crevices and meandering cavities of the earth.

Water appears to be the link between fire and the cumbrous elements of bodies. Fire, by its activity, and its attachment of the water, becomes the main spring of nature,

ture, and serves to undress this earth, to change her wondrous attire, and to renew her youth. Clouds and mists swim in the air, as ships in the seas; and while they float in the ocean of atmosphere, at the height of their specific gravity, they yield to the lateral attraction of mountains, in whose embraces they become the parents of perpetual springs, that wander down, from the greatest elevation of land, on all sides to the seas; where, having kindly watered, and refreshed all parts of the earth, they mingle once more with old ocean, from whom they arose a thousand times before. This circulation is remarkably analogous to the revolutions of the elements of more fixed bodies.

The true principles of husbandry, are extremely simple and obvious; it is easy to conceive, that the dung of vegetables, their ashes, soot, or any corrupted *residuum* of a body that had taken its nutriment directly or remotely from vegetables, after it has been violently rent from the sociable and related volatile particles, should attach from the air, and from fruitful showers, their congenial and kindred elements, from whom they have been separated, and bloom once more into vegetation. Tho' this theory was unknown, yet the practice of husbandmen was agreeable thereto, because

cause the experience of success stood to them in the place of knowledge.

The professors of physic have become objects of ridicule and comedy, by the profound darkness in which they groped for science; and the uncouth, insignificant, and obscure intelligence they gave of disorders, of the operations of medicine, and of the constitution of animated creatures. Let us just slide over the œconomy of nature, in her attendance to, and nurture of the animal constitution, and see how far it is agreeable to her laws in her other grand departments. By a peculiar preparation in the stomach, carried on to the *duodenum*, and to the parts adjacent, there is a separation made in the food; and the chyle, which is selected for animal nourishment, is transmitted to the blood; in whose circulation, it is, by innumerable capillaries, and the slender rivulets into which the arteries divide, distributed to every part of the frame. Where the capillary arteries retire from sight, and end, a proportionable number of minute veins arise, and receive the blood that is lost by the arteries; those veins gradually unite, as they return to the heart, and the blood in its progress back, is again replenished by new accessions of chyle.

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It has been often observed, that digestion is not accounted for by any motion or concoction, and that substances are dissolved in the stomach, in a much shorter time than they could be by the fiercest boiling over a culinary fire: but when we consider, that nature has prepared menstruums for such resolutions or separations, and the short time in which a stone of lime will dissolve when imbued with water, we conceive an adequate cause of digestion.

It is no wonder that the blood, which is the universal vehicle of the acquisitions that reach the human frame, whether they enter by our food or by the air, should be the principal seat of sickness and health, and the mirror of the constitution. As the blood is in perpetual motion and operation, so animals enjoy a perpetual spring; and may be considered as ever-greens, or like the great world itself, in perpetual vegetation, and perpetual dissolution. What the atmosphere, pregnant with the elements of bodies, is in the large world, the blood, with the chyle diffused thro' it, appears to be in the animated body; both owe their activity to the fire, which invigorates the respective fluids: and as the scene of decay and vegetation in the large world, lies upon the surface, the circulation of the fluid is performed upon the surface; but in the
little

little world, the human body, as the renovation extends interiorly thro' the whole frame, the fruitful fluid or atmosphere thereof circulates within, and distributes its stores to every part of the animal fabrick.

The blood, in the capillary arteries, bears a close analogy to the fruitful showers that descend on the earth, surcharged with the elements of growing bodies, which they deposit in the mold; the blood, by a shower of rills, for ever in motion, distributes nourishment to every part of the body; and riseth again, depauperated in the veins, like the water in springs, discharged of its contents, to run the same round again.

When a vigorous mass of blood is invaded by any insociable, hostile elements, then, from the simplest and most obvious principle, the result and union of the whole liquid tends to repel it; and reciprocally, the morbid inimicable matter re-acts upon the blood; whence the effervescence of the blood, with its symptom, a quick, high pulse; and the crisis, is attended by the expulsion of the peccant matter, and a proportionable evacuation; or by the destruction and dissolution of the essential constitution of the blood, and succeeding death. But when the vicious matter is only the ordinary attraction of a crazy discordant constitution, now become
a chaos,

a chaos, and finds an amicable reception and quiet abode in the body, then, instead of a sudden fever, and violent effort of the united frame, will ensue infirmity, misery, and gradual advances to mortality; which is the case in chronical disorders, in a broken shattered constitution, or a ripe old age. Death is a final separation of the original specific constitution, or embryo-principles; whether by a slow invasion of disorder, or by a sudden breach. The smell of bodies, especially of those that are much consumed before death, is an evidence of the dissolution begun, long before the lamp of life is extinguished. Ravens, whose sense of smelling is so extremely exquisite, testify, by their fatal attendance on the sick, that the dissolution of the frame is far advanced, and that the air is highly impregnated with the efflu-
vium of the corrupting body.

From the slightest view of the process of nature, we have no reason to believe that the food is assimilated into blood, by a conversion or change of the substance; or that the blood in like manner is after converted into fat, flesh, bones, &c. we have no foundation for such an amazing and violent metamorphosis, in the course of this our material system. In the nurture of the
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animal body, the case is only, that the blood, the atmosphere of the little world, is the vehicle which, by its circulation, distributes the repairing constitutional elements, that have been recently separated from the food, by a course of natural chemistry, thro' the whole frame; wherein they are selected and fixed, by their congenial and related elements.

We see that no parts of the animal frame are fixed and permanent; the bones and the sinews dissolve, and yield to time, or the rage of fire; their volatile parts escape, and at length leave behind them only a *residuum* of clay: those volatile parts, along with their kindred elements, are from the circulating air, the dews, and showers, imbibed by vegetables; and by them in food, and partly by the air we breathe, restored again to animals. Wholesome food is such, as contains all the principles necessary for the sustenance of the various parts of the body, without the mixture of any discordant unfriendly elements, but what are easily separated and carried off by the usual channels. Unwholesome and improper food, seem to be such as are destitute of some of the constitutional elements of animal bodies, and of the power of acquiring those elements from

from the air we breathe; or that contain some elements destructive to the animal frame, which are not wholly separable by digestion, but pass forward, in the embraces of the constitutional principles, to the blood. When such a destructive association happens, the separation of them in the blood occasions a ferment and disorder, and an evacuation of them becomes necessary, to restore health and tranquillity: but if they be not expelled by the blood, if they still adhere, and mingle in the frame, then our food becomes our sure poison; noxious and destructive attractions bring home new enemies into the constitution; they daily gather force, and we become a prey to slow and inveterate disorders. It is also to be observed, that things taken in the usual and ordinary channel, with salutary or innocent effects, become noxious when they happen to arrive at the blood, without the ordinary and proper secretions: water being drank, is the best diluter of our food; but if it maketh its way thro' the pores, from dews or wet sheets, it is very dangerous. The general effects of poisons, in the animal creation, strongly prove, that as animals are destroyed by the same common foes, they select nearly the same elements to sustain

the fabric, and are formed of similar principles. I must own, there seem to be exceptions to this general observation of poisons; goats are said to browse on hemlock; yet such excessive irregularities in food are seldom observed to be made by creatures, who are constituted of similar parts with us; and the quantity taken in such cases is always trifling; like those suspicious mixtures which bold physicians sometimes venture to prescribe in extraordinary cases. The general rule of nature is, that the nutriment and poisons of the larger animals, whose fabrick is formed of similar materials, are nearly the same; and it is a certain mark to our sailors when they arrive in India, that the fruits are not noxious, if they have been pecked by the birds. Tho' in this prospect of the œconomy of nature, in the aliment and support of animals, old age and death appear inevitable; yet it seems reasonable to expect, that regulations may possibly be made for the protraction of health and life, to the furthest possible extent; and for assuaging the evils that ordinarily prey on the human frame.

But the most striking, universal, and sublime result of this view of nature, is a sense of the immediate presence and action of the Divinity; and of the immense plan
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of creation, agreeable to which the principles of bodies were originally balanced and proportioned, to form this world. If we conceive the elements of bodies, unactuated and uninspired by attraction, then they are impalpable, invifible, and incapable of becoming even objects of fenfe; their ftate is obfcurity, and approaching to inanity: but thefe barren and infenfible elements, being once endued with proportioned and adjusted attractions and repulfions, they fpring forth from their obfcurity; without perception they are infpired by inftinctive motion, and unerring affections; they meet with the embryoes, or fpecific originals of animals, vegetables, and of other bodies, ftamped by the divine law of fpecies, they rufh to their kindred principles; and cohere, or feparate, with infinite regularity: they form the glorious world, and preferve the ftedfaft courfe of nature.

Matter, at firft fight, feems to be the only being we have a correſpondence with; it feems to meet us every where, and to fill the whole groupe of the imagination; until we examine it, and then it ſhrinks, like a phantom, behind idea or perception. We know it not, we perceive it not; all we find inſtead thereof, are the ideas we call material,

material, from their supposed origin; but the ideas themselves which we perceive, are not material, and demonstratively come to us from some other origin, which is not material; and which has arbitrary sovereignty and presence in the soul. As for matter, the closer we examine it, the further it glides away from us; and all that we can at length ascertain of it, is, that it is a shadowy and dubious shroud, under which sovereign power retires from plain view, and acts by regular laws.

If I be asked what knowledge we have of the existence of external matter? I answer, we have information thereof, by two distinct kinds of revelation; the one natural, the other supernatural.

It is evident our ideas are not material beings; our ideas of matter have not length, breadth, resistance, colour, nor distance; yet they infer to us all these properties of matter, as external to the mind: how they infer any thing to us that is not merely conception or idea, I know not, but such is the fact; and when that which hath neither length, breadth, resistance, colour, or distance, infers to us, and becomes the sign of length, breadth, resistance, colour, and distance; and this relation is obtruded on us, against all reason or analogy; I conclude

clude it to be a revelation from some power, who makes impressions arbitrarily on the mind. If I be further asked, do not length, resistance, colour, distance, become ideas or mental beings, by being represented or inferred to the mind? I answer, not, since they never were in the mind, and the ideas we refer to length, breadth, resistance, colour, and distance, want all those material qualities, and are actually no more than notices of those external qualities which do not become ideas, or conceptions, tho' they be inferred and represented to the mind, in a manner we can neither resist nor account for, and indeed in a manner that seems impossible, if the fact did not convince us

To consider this matter a little further, ideas are marks, signs, or characters in the mind, that represent to us external objects: but while they want every property whatever of external matter, they are as perfectly inadequate thereto, as sounds or written words are to the ideas they represent. Now, it is well known, that the relation between sounds and ideas, being merely arbitrary, is established amongst mankind by consent, and learned by use and practice; and where this relation became known, without use and practice, as to the apostles, when they
spoke

spoke strange and new tongues, it was justly called inspiration; so, where an unavoidable relation is found, between ideas that have neither length, breadth, resistance, colour, or any other material property, and external objects which are utterly opposite in every respect to those ideas, and this relation has not been established by the consent of mankind, as in the case of language, but is obtruded upon us by a means and power we know not of, it is as really inspiration as the case of the apostles, with only this difference, that one was uncommon, the other is made every day to all mankind, and no more extraordinary nor heeded than generation; or than creation would be, if creation were the ordinary and common work of every day. All that we can determine, with certainty, of the source of this universal language, with which all, or the far greater part of animated beings are endued, is, that the ideas or signs in the mind are wholly immaterial; that their relation to their object is utterly incongruous and arbitrary; that they bring intelligence of an external being to the mind, from which it finds itself separated by fatal and impassible barriers, and that this intelligence comes from a being who hath absolute do-

dominion over the mind, and exerciseth authority there independent of our will. These are my reasons for attributing our natural information of the existence of external matter, to a revelation made to all mankind. Besides this, we have the particular and supernatural revelation, made to Moses, of the creation of the external world: and both of these corroborate each other, and reveal to us the existence of external matter; but when we attempt to grasp it by reflection, and to make it the object of reason, it sinks into obscurity, it vanishes from us, and its very existence becomes known only by immaterial mediation

We are lost and surrounded in spirit; the mind can as easily forsake itself, as quit the divine presence; motion or distance cannot separate them. In the rural scenery of nature, we almost feel the *Shechinah*, the unseen glory that animates and irradiates the landscape, like a dream, which strongly possesseth us in confusion, while we labour to recollect it in vain. No wonder the antient heathens, who had the Deity much to seek for, sacrificed in groves, and imagined they found there the holy influence: in the prodigious and sublime parts of the creation, we are astonished by it;

L

the

the mind, as it were, opens its eyes with wonder, with rapture, and sacred horror: we see the divine and awful traces in mighty mountains, in precipices, and oceans; and hear the conscious echo of Divinity, in storms and breaking seas. Like a deserted infant, that hath lost its mother, and, in deep distress, just got a glimpse of her, or heard her distant voice, the human mind, springs forward at the ideas of stupendous power and grandeur, and, panting with eager conscious delight, forsakes with contempt and disgust the low ideas of matter: and if poets expressed such sentiments by *soaring, raptures, transports, and flights*, they did so because it is not in the power of Language, in proper words, to represent the inutterable, vast emotions of mind, by which it attempts to disengage itself of its present incumbrances, and to become a superior being in a loftier scene, for which it enlarges its views and conceptions, a thousand fold, by a power wholly divine, that it knew not of.— But I am here pressing beyond the limits of my design in this little essay.

I have ventured, out of the common road, to trace the footsteps of nature. In the production of the seeds, and of the
embryoes

embryoes of things, and in the first or fountain laws of generation, she is wholly retired and clouded from observation. In the subsequent œconomy, in the growth and corruption of bodies; and in the bands by which she holds the universe, she deigns just to appear in view; and, in her regular effects, she comes into plain day-light, in order to raise our attention, and convince us of design and power, that overwhelm us in admiration and awe. In what we see, we behold a surprising simplicity, an union of design, and œconomy, along with the most divine and endless opulence. We see a creation, fixed on the solid basis of eternity, launching along thro' unceasing time, in a perpetual and determined revolution and variety of being and life; and all depending on the limited and directed attractions and repulsions of a few stable, unchangeable elements. Can thought rise to any thing so noble, so great, and stupendous in the effect, or so simple and plain in the cause? Supreme Spirit! thine is the divine charm, by which mountain and valley, forest and ocean, wonderous animal, and a whole creation, in beauty and proportion, arise to being. Let but a few attractions cease,
in

in whose bonds you grasp them, and the magic universe is at an end; it is without form and void; and the very ruins thereof are not to be found.

E R R A T A.

PAGE 40, line 18, after *mind*, a semicolon.

———— 46, — 16, — *mind*, a comma instead of a full stop.

———— 46, — 24, — for *thal*, read *that*.

———— 48, — 12, — for *ame*, read *same*.

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F I N I S



